

PTO 06-1352

CY=JA DATE=19910812 KIND=A
PN=03-184028

STILL VIDEO CAMERA
[Suchiru bideo kamera]

Tadashi Saito, et al.

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. December 2005

Translated by: FLS, Inc.

PUBLICATION COUNTRY	(19):	JP
DOCUMENT NUMBER	(11):	3-184028
DOCUMENT KIND	(12):	A
	(13):	
PUBLICATION DATE	(43):	19910812
PUBLICATION DATE	(45):	
APPLICATION NUMBER	(21):	1-324631
APPLICATION DATE	(22):	19891214
ADDITION TO	(61):	
INTERNATIONAL CLASSIFICATION	(51):	G03B 9/04, 9/08, 11/04; H04N 5/225, 5/235
DOMESTIC CLASSIFICATION	(52):	
PRIORITY COUNTRY	(33):	
PRIORITY DATE	(32):	
PRIORITY NUMBER	(31):	
INVENTORS	(72):	SAITO, TADASHI; MINAKI, TAKASHI; KOIZUMI, YUKINORI.
APPLICANT	(71):	KONICA CORPORATION
TITLE	(54):	STILL VIDEO CAMERA
FOREIGN TITLE	[54A]:	SUCHIRU BIDEO KAMERA

1. Title of the Invention

Still Video Camera

2. Claims

A still video camera comprising a photographic lens, an aperture mechanism for limiting the amount of light in the light beam directed towards the photographic lens, a beam splitter for splitting the light beam directed towards the photographic lens in two before the aperture, a TTL finder for directing one of the split light beams, a solid photographic element with electronic shutter function for directing the other split light beam, a light-blocking mechanism connected to the operation of the aperture mechanism to prevent the directing of the light beam towards the solid photographic element when a photograph is not being taken, and an eyepiece shutter mechanism for blocking the light directed back into the camera from the eyepiece.

3. Detailed Description of the Invention

(Industrial Field of Application)

The present invention relates to a still video camera using a TTL finder.

(Background of the Invention)

Still video cameras currently use a TTL finder with a beam splitter. A solid photographic element is not used for the electronic shutter function.

The following is an explanation of the various functions.

* Numbers in the margin indicate pagination in the foreign text.

The eyepiece splitter will be explained first. In a camera using a TTL finder, light directed back from the eyepiece is kept from adversely affecting the light measurement values when the TTL light is measured and when there is measurement light inside the finder through the range finder. An eyepiece shutter mechanism is installed to keep light from being directed back inside the finder. /194

The eyepiece shutter mechanism is usually connected so that it is closed by the mirror up operation of the quick mirror and opened by the mirror down operation.

The power source for the eyepiece shutter changes the energy during mirror up and mirror down.

The shutter mechanism in a still video camera will now be explained. Shutters for still video cameras are either mechanical shutter mechanisms for mechanically controlling the exposure time for the photographic element or electronic shutter mechanisms for controlling the exposure time through electronic control.

(Problem to be Solved by the Invention)

When an eyepiece shutter mechanism is used in a still video camera, the camera has to be a camera with a quick return mirror.

The power source used to wind film in a silver salt film camera can be used to operate an eyepiece shutter, but since a still video camera does not need a power source for winding film, such a power source cannot be used.

The power used to operate the shutter can be used instead of the power for winding film, but an eyepiece shutter needs more power. Also, the shutter is operated at a higher speed. The photographic element in still video cameras also has an electronic shutter mechanism, so no power is needed to operate the shutter.

A power source, such as a dedicated motor or actuator could be used, but the use of an actuator is expensive.

In addition, light is split in back of the aperture. Because the aperture has to be opened in order to view the finder, the photographic element uses an electronic shutter function. The light split for the finder uses a beam splitter instead of a movable mirror, and light is directed to the photographic element while the aperture is open.

Therefore, light is directed towards the photographic element when the power is turned on even when a lens barrier is attached so as to operate with the power source and even when the aperture is closed when the power is turned off. The power can be turned on for a brief period and turned off when not in use. However, enough light may not reach the photographic element when briefly turned on and the power may be turned off while a photograph is being taken.

When light reaches the photographic element, the photographic element stores an unnecessary charge. When a photograph is taken, this unnecessary charge has to be eliminated. As a result, a lot of power is consumed and there is a photographic timing lag. In a worst

case scenario, the light is too strong and the photographic element is burned.

A beam splitter should be placed in a position in front of the aperture in order to prevent this situation. This way, the finder can be used when the aperture is closed, and the aperture is opened only when a photograph is taken. The light beam has to be directed afocally in order to make sure the light is focused equally in the aperture portion.

The aperture mechanism is usually placed behind the lens group [1c] shown in FIG 1 for rendering the light beam afocal. However, when a beam splitter is placed between the lens group [1c] and the aperture, the afocal range has to be extended further back. Inevitably, the diameter of a portion of lens group [1a] in the optical system has to be increased, and the overall length has to be increased. This makes it difficult to reduce the size of the camera.

Because the beam is divided in front of lens group [1d], the master system has to be in the finder system. This increases the number of lenses and also increases the cost of the camera.

Ideally, the light beam should be split behind the aperture and behind the master lens in order to reduce the beam splitting space and minimize the number of lenses.

In light of this situation, the purpose of the present invention is to provide a still video camera which is able to prevent light directed back from the finder from adversely affecting measured light and photographed images and which prevents unnecessary light from

reaching the photographic element when a photograph is not being taken.

/195

(Means of Solving the Problem)

In order to solve this problem, the present invention is a still video camera comprising a photographic lens, an aperture mechanism for limiting the amount of light in the light beam directed towards the photographic lens, a beam splitter for splitting the light beam directed towards the photographic lens in two before the aperture, a TTL finder for directing one of the split light beams, a solid photographic element with electronic shutter function for directing the other split light beam, a light-blocking mechanism connected to the operation of the aperture mechanism to prevent the directing of the light beam towards the solid photographic element when a photograph is not being taken, and an eyepiece shutter mechanism for blocking the light directed back into the camera from the eyepiece.

(Operation)

In the still video camera of the present invention, the amount of light in the light beam directed from the photographic lens is controlled by the aperture mechanism, and divided in two by the beam splitter. One light beam is directed towards the TTL finder. The light beam directed towards the TTL finder is measured by the light measuring element.

The other light beam is directed towards the solid photographic element attached to the electronic shutter function.

A light blocking mechanism is connected to the operation of the aperture mechanism to keep the light beam from being directed towards the solid photographic element when a photograph is not being taken.

The eyepiece shutter mechanism is connected to the operation of the aperture mechanism in order to block the light directed back inside the camera from the eyepiece.

(Working Examples)

The following is an explanation of working examples of the present invention. FIG 1 is a side view of the optical system in the first working example of the present invention. FIG 2 is a top view of the finder system in FIG 1. FIG 3 is an exploded perspective view used to explain the aperture mechanism in FIG 1. FIG 4 is a diagram used to explain the operation of the aperture mechanism in FIG 3. FIG 5 is a simplified exploded perspective view of the eyepiece shutter mechanism and light-blocking mechanism in FIG 1. FIG 6 is a diagram used to explain the joint in FIG 5. FIG 7 is a flowchart used to explain the operation of the first working example. FIG 8 is a flowchart used to explain the setting subroutine in FIG 7. FIG 9 is an exploded perspective view used to explain another version of the aperture mechanism in the first working example. FIG 10 is a flowchart used to explain another operation of the first working example. FIG 11 is a simplified diagram used to explain the second working example. FIG 12 is an exploded perspective view used to explain the third working example. FIG 13 is a diagram used to explain the operation of the aperture plate in FIG 12. FIG 14 is a

diagram used to explain the first cam operation in response to the operation of the aperture plate in FIG 13. FIG 15 is a diagram used to explain the first cam operation in response to the operation of the aperture plate in FIG 13. FIG 16 is a diagram used to explain another aperture plate in the third working example.

The first working example will now be explained with reference to FIG 1 through FIG 10. First, the optical system in the still video camera of the present invention will be explained with reference to FIG 1 and FIG 2.

In FIG 1, 1 denotes the photographic lens. The photographic lens [1] actually consists of three lens groups [1a, 1b, 1c] and a master lens group [1d]. The focal point (focusing) is adjusted by moving lens group [1a], and the field angle (zooming) is adjusted by moving lens groups [1b] and [1c].

2 denotes the beam splitter used to split the light beam passing through the photographic lens [1] in two. One of the light beams split by the beam splitter [2] is directed towards the photographic system [S] and the other light beam is directed towards the TTL finder [F].

In the photographic system [S], 3 denotes the optical filter used as the optical low pass filter. 4 denotes the photographic element with attached electronic shutter function to capture the light beam passing through the optical filter [3].

A beam splitter is used in this working example for the following reason. A still video camera is capable of more rapid

shooting than a silver salt film camera (theoretically, 60 frames per second compared to 5-10 frames per second in the case of a silver salt film camera). Because silver salt film cameras generally use a quick mirror system, this causes a moment of inertia problem for various components. This is also a problem for the high-speed rapid shoot of the still video camera. Therefore, the beam splitter [2] is not connected mechanically and is used in high-speed rapid shooting. /196

Next, in the finder system F in FIG 1 and FIG 2, 5 denotes a mirror for reflecting the light beam split by the beam splitter [2] after image formation. 6 denotes the finder, and the finder [6] consists of relay lens groups [6a, 6b] and a magnification lens group [6c]. By moving the magnification lens group [6c], the angle of vision can be changed. Some of the light beam is reflected between the relay lens groups [6a, 6b], and the half mirror [7] receives the rest. 8 denotes a focusing lens for focusing the light beam reflected by the half mirror [7], and 9 denotes the light measuring element for receiving the light focused by the focusing lens [8] and measuring it.

In FIG 1, 10 denotes the aperture mechanism installed between a lens group [1c] and the master lens group [1d] of the photography lenses [1]. 11 denotes an eyepiece shutter mechanism connected to the operation of the aperture mechanism and installed between the relay lens group [6b] and the magnification lens group [6c] of the finder [6]. 12 denotes a light blocking mechanism connected to the operation of the aperture mechanism [10] to prevent the reception of light

beams by the photographic element [4] when a photograph is not being taken.

The following is a detailed explanation of the components. First, the aperture mechanism [10] will be explained with reference to FIG 3. In the figures, 13 is a lens mirror cylinder for the photographic lenses, and 14 is the group plate to which the lens mirror cylinder [13] is attached. 15 is the aperture drive motor (stepping motor) attached to the ground plate [14], 16 is the gears operated by the aperture drive motor [15], and 17 is the rotating aperture plate with a medium aperture hole [17a] and small aperture hole [17b] rotated by the gears [16]. 18 is the fixed aperture plate with an open aperture hole [18] in the center. One of the gears [16] is attached to a shaft [19] to which power from the light blocking mechanism [12] is transmitted.

The following is an explanation of the rotating aperture plate [17] with reference to FIG 4. In this figure, a small aperture hole [17a] and a medium aperture hole [17b] are formed in the rotating aperture plate [17]. The fixed aperture plate [18] with the open aperture hole [18a] arranged along the light axis to the photographic lenses [1] is attached to the back of the rotating aperture plate [17].

By rotating the rotating aperture plate [17], the desired aperture value can be adjusted. For example, in FIG 4, (a) is the fully closed state, (b) is the small aperture state, (c) is the medium aperture state, and (d) and (e) are the open (fully open)

states. Here, the state in FIG 3 corresponds to (b) in FIG 4. Also, (3) is the standby position.

Next, in FIG 5, 20 denotes the joint applying power to the shaft [19]. The output end of the joint [20] is connected to the shaft [21].

The light blocking mechanism [12] will now be explained. 22 is a lever attached to the base at the center of the shaft [21] so as to rotate with the shaft [21]. The end of the lever [22] has a slot [22a]. 23 is the light blocking plate with a protrusion [23a] that engages the slot [22a] in the lever [22]. The rotation of the lever [22] moves the light blocking plate [23] linearly in the direction of the arrow, and blocks the light directed at the photographic element [4]. 24 is a spring wound around the shaft [21], engaging the lever [22] on one end, engaging the base on the other end, and applying force on the lever [22] at the open position of the light blocking plate [23] (allowing light to pass through to the photographic element [4] as indicated by the solid line).

The eyepiece shutter mechanism [11] will now be explained. The base end of the lever [22] is attached to the other end of the shaft [21]. A slot [25a] is formed at the rotating end of the lever [25]. 26 is the eyepiece shutter plate with a protrusion [26a] engaging the slot [25a] in the lever [25]. By rotating the lever [25], the eyepiece shutter plate [26] moves linearly in the direction of arrow II, and the light beam traveling towards the eyepiece is blocked or admitted. 27 is a spring wound around the shaft [21], engaging the /197

lever [25] on one end, engaging the base on the other end, and applying force to the lever [25] at the closed position of the eyepiece plate [26] (in the position blocking the path of light to the finder [6] as indicated by the solid line).

The following is an explanation of the joint [20] with reference to FIG 5 and FIG 6.

The joint [20] consists of a first plate [20a] attached to the shaft [19] on the aperture mechanism [10] end and a second plate [21] attached to the shaft [21] on the eyepiece shutter mechanism [11] and light blocking mechanism [12] end. Two arcuate slots [20c] are formed in the second plate [20b] as shown in FIG 6. Two pins [20d] for engaging the slots [20c] in the second plate [20b] are formed in the first plate [20a].

In FIG 6, the state corresponds to (b) in FIG 4. Here, when the rotating aperture plate [17] moves from (b) → (c) → (d) → (e), the shaft [19] rotates to the right in FIG 3. Here, the rotating aperture plate [7] does not transmit rotational force to the shaft [21] between (a) and (d) (region A in FIG 6). The joint [20] helps it skip over (d) so it can rotate to the right and transmit the rotational force of shaft [19] to shaft [21].

When (d) is overcome (region B in FIG 6, the open state of the aperture mechanism [10]), the light blocking plate [23] of the light blocking mechanism [12] resists the action of the spring [24] and moves from the solid line position to the dotted line position (blocking the path of the light to the photographic element [4]). The

eyepiece shutter plate [26] of the eyepiece shutter mechanism [11] resists the action of spring [27] and moves from the solid line position to the dotted line position (allowing the light path to travel towards the finder [6]).

The operation of this configuration will now be explained with reference to FIG 7 and FIG 8. At first, in Step 9 explained below, the aperture is open, the light blocking plate [23] of the light blocking mechanism [12] is closed, and the eyepiece shutter plate [26] of the eyepiece shutter mechanism [11] is open.

Next, monitoring of the power switch (not shown) continues to determine if it has been turned ON. Here, monitoring continues if OFF (Step 1).

Next, the shutter switch (not shown) is half pressed, and the system monitors to see if the S1 switch has been turned ON (Step 2). Here, the monitoring continues if OFF (Step 3).

Next, the AE lock SW is monitored to see if it has been turned ON or OFF. Here, the process moves to Step 5 if OFF and Step 10 if ON (Step 4).

In Step 5, the shutter switch is pressed down and monitoring is conducted to see if the S2 switch has been turned ON. If OFF, monitoring continues (Step 5).

When the S2 switch has been turned ON, the light is measured. At this time, the exposure value is A (Step 6).

Exposure value A is used to perform the setting subroutine (a) in FIG 8.

If the S2 switch has been turned ON, the aperture is set and the eyepiece shutter is closed (Step 7-1).

Returning to FIG 7, a photograph is taken (Step 8).

When photography is complete, the aperture is open, the light blocking plate [23] of the light blocking mechanism [12] is closed, and the eyepiece shutter plate [26] of the eyepiece shutter mechanism [11] is open (Step 9).

If the AE lock SW is ON in Step 4, the light is measured immediately. At this time, the exposure value is B (Step 10).

The monitoring continues until the S2 SW is pressed (Step 11).

The exposure value B is used to perform the setting subroutine in FIG 8 (a) (Step 7).

In this configuration, the aperture mechanism [10] is linked and operates with the light blocking mechanism [12] and the eyepiece shutter mechanism [11]. This, however, is not restricted to a quick return camera. An eyepiece shutter mechanism [11] and light blocking mechanism [12] can be used in a still video camera at low cost.

By installing a light blocking mechanism [12], the photographic element [4] is kept from getting burnt and a photographic timing lag is eliminated. /198

By installing an eyepiece shutter mechanism [11], the light directed back from the finder [6] does not adversely affect light measurements or photographs taken.

In the first working example, the aperture mechanism [10] has a rotating aperture plate [17]. However, the mechanism is not

restricted to this configuration. For example, the configuration shown in FIG 9 can be used. In this figure, 32 is an aperture drive motor, 33 is a shaft for transmitting force to the eyepiece shutter mechanism via gears [32], and 34 is an aperture plate with multiple aperture holes and a rack for engaging the gears [32]. This aperture plate [34] operates linearly.

This working example can operate as shown in FIG 10.

In Step 20 described below, the rotating aperture plate [17] is open, the light blocking plate [23] is closed, the eyepiece shutter plate [26] is open, and the system monitors to see if the power switch SW has been pressed (Step 12).

Next, the system continues to monitor the situation until the S1 SW is pressed (Step 13).

If the S1 SW has been pressed, the light is measured and light distance is measured (Step 14).

Next, the system continues to monitor the situation until the S2 SW is pressed (Step 15).

The setting subroutine in FIG 8 (a) is then performed (Step 16).

Next, the system monitors to see if the AE lock has been turned ON or OFF (Step 17).

If OFF, a second light measurement is made (Step 18). If ON, Step 18 is skipped and a second light measurement is not made.

A photograph is taken (Step 19).

When done, the rotating aperture plate [17] is open, the light blocking plate [23] is closed, and the eyepiece shutter plate [26] is open (Step 20).

The second working example of the present invention will now be explained. In the first working example, the eyepiece shutter mechanism [11] is closed when a photograph is taken. During rapid shooting (e.g., more than 10 frames per second), the finder cannot be used to view the object being photographed. This problem is solved in the second working example.

During rapid shooting, the eyepiece shutter plate [26] in the eyepiece shutter mechanism [11] is forcibly opened using a mechanical switch. However, in the first working example, the light blocking plate [12] and the eyepiece shutter mechanism [11] are connected by a shaft [21]. Therefore, when the eyepiece shutter plate [26] is open, the light blocking plate [23] of the light blocking mechanism [12] is closed so the photographic element [4] is not exposed. Therefore, the eyepiece shutter mechanism [11] is the mechanism shown in FIG 11.

In FIG 11, an arm [35] perpendicular to the rotational shaft is fixed to the end of the shaft [21] on the eyepiece shutter side to transmit power from the light blocking mechanism [12] to the eyepiece shutter mechanism [11]. A lock [36] that can come into contact with the side of the lever [25] is also formed in the rotational shaft of the arm [35].

Because of this configuration, the eyepiece shutter plate [26] operates independently of the light blocking mechanism [12]. Even

when the mechanical switch is used to open the eyepiece shutter plate [26], the light blocking plate [23] can be opened and closed based on the photographic timing.

The operation of this configuration will now be explained with reference to FIG 8 (b).

In this operation, only the setting subroutine differs from the first working example. Only this subroutine will be explained. A explanation of the rest of the operation has been omitted.

In FIG 8 (b), the system monitors to see if the rapid shoot switch has been pressed (Step 7-2). If the rapid shoot switch has been turned ON, the mechanical switch is used to keep the eyepiece shutter open (Step 7-3). If the rapid shoot switch is OFF, the aperture is set in the same manner as Step 7-1, and the eyepiece shutter is closed (Step 7-4). The process then advances to Step 7 in the main routine.

In addition to the effect of the first working example, this /199 configuration allows for rapid shoot photography.

The second working example is not restricted to this configuration. For example, in FIG 5, there is no joint [20] and shaft [19] and shaft [21] are connected. This configuration provides the same effect, even though the eyepiece shutter mechanism [11] and light blocking mechanism [12] have the same mechanisms in FIG 11.

The third working example of the present invention will now be explained with reference to FIG 12 through FIG 16. When rapid shoot photography was performed in the second working example, a mechanical

switch was used to open the eyepiece shutter. In the third working example, this switching operation is automatic.

First, in FIG 12, **41** is the shaft connected to the aperture mechanism [10]. **42** is the eyepiece shutter mechanism operated by the shaft [41], **43** is the light blocking mechanism operated by the same shaft [41], and **44** is the photographic element.

The light blocking mechanism [43] will now be explained. **45** is a rotatable lever attached to the main device. A slot [45a] is formed in the rotating end of the lever [45]. A pin [46] is formed near the center of the lever [45].

A first cam [47] is attached to the shaft [41] so as to make contact with the pin [46].

48 is a light blocking plate with a protrusion [48a] engaging the slot [45a] in the lever [45].

By rotating the lever [45], the light blocking plate [48] moves linearly in the direction of arrow III, and the light beam is blocked or allowed to travel in the direction of the photographic element [44]. **49** is a spring wound around the rotating shaft [50] of the lever [45], engaging the lever [45] on one end, engaging the base on the other end, and forcing the lever [45] to the position where the light blocking plate [48] is open (allowing the light beam to travel towards the photographic element [44] indicated by the solid line).

The eyepiece shutter mechanism [42] will now be explained. **51** is a lever attached to the rotating shaft [52] near the center so as to rotate around the rotating shaft [52]. A slot [51a] is formed in the

rotating end of the lever [51], and a pin [53] is attached to the other end. 54 is an eyepiece shutter plate with a protrusion [54a] for engaging the slot [51a] in the lever [51].

A second cam [55] is attached to the end of the shaft [41] so as to make contact with the pin [53].

The rotation of the lever [51] moves the eyepiece shutter plate [54] linearly in the direction of arrow IV, blocking or permitting the passage of the light beam towards the eyepiece. 56 is a spring wound around the rotating shaft [52] in the middle, engaging the lever [51] on one end, engaging the base on the other end, and applying force to the lever [51] at the position where the eyepiece plate [54] is closed (blocking the travel of the light beam towards the finder [6] as indicated by the solid line).

The aperture plate [60] will now be explained with reference to FIG 13. The first cam [47] and second cam [55] rotate once with each rotation of the aperture plate [60]. The aperture plate [60] contains a standby hole [60a], three normal photography holes [60b] and three rapid shoot holes [60c].

(a) is open aperture with the eyepiece shutter in the closed state. At this time, the first cam [47] is in state (a) in FIG 14, and the second cam is in state (a) in FIG 15.

(b) is middle aperture for normal photography with the eyepiece shutter in the closed state. At this time, the first cam [47] is in state (b) in FIG 14, and the second cam is in state (b) in FIG 15.

(c) is middle aperture for rapid shoot photography with the eyepiece shutter in the open state. At this time, the first cam [47] is in state (c) in FIG 14, and the second cam is in state (c) in FIG 15.

In this configuration, the eyepiece shutter is automatically closed (sic) during rapid shoot photography in addition to the effect of the second working example.

The present invention is by no means restricted to the third working example. For example, in this working example, the aperture plate [60] had a rapid shoot aperture [60c] and a normal photography aperture [60b]. However, as shown in FIG 16, the rapid shoot and /200 normal photography apertures can be combined, and a number of photography apertures [61b] and a standby aperture [61a] can be formed in the aperture plate [61].

Here, the reduction gear ratio can be selected so that the first cam [47] and the second cam [55] rotate once for every two rotations of the aperture plate [61].

In these working examples, the eyepiece shutter was situated between the eyepiece and the light-measuring element. However, it can also be situated to the outside of the eyepiece.

(Effect of the Invention)

As explained above, the present invention is a still video camera comprising a photographic lens, an aperture mechanism for limiting the amount of light in the light beam directed towards the photographic lens, a beam splitter for splitting the light beam

directed towards the photographic lens in two before the aperture, a TTL finder for directing one of the split light beams, a solid photographic element with electronic shutter function for directing the other split light beam, a light-blocking mechanism connected to the operation of the aperture mechanism to prevent the directing of the light beam towards the solid photographic element when a photograph is not being taken, and an eyepiece shutter mechanism for blocking the light directed back into the camera from the eyepiece.

The result is a still video camera in which the light directed back from the finder does not adversely affect the measured light or photographed images, and in which unnecessary light can be kept from being directed towards the photographic element when a photograph is not being taken.

4. Brief Explanation of the Drawings

FIG 1 is a side view of the optical system in the first working example of the present invention.

FIG 2 is a top view of the finder system in FIG 1.

FIG 3 is an exploded perspective view used to explain the aperture mechanism in FIG 1.

FIG 4 is a diagram used to explain the operation of the aperture mechanism in FIG 3.

FIG 5 is a simplified exploded perspective view of the eyepiece shutter mechanism and light-blocking mechanism in FIG 1.

FIG 6 is a diagram used to explain the joint in FIG 5.

FIG 7 is a flowchart used to explain the operation of the first working example.

FIG 8 is a flowchart used to explain the setting subroutine in FIG 7.

FIG 9 is an exploded perspective view used to explain another version of the aperture mechanism in the first working example.

FIG 10 is a flowchart used to explain another operation of the first working example.

FIG 11 is a simplified diagram used to explain the second working example.

FIG 12 is an exploded perspective view used to explain the third working example.

FIG 13 is a diagram used to explain the operation of the aperture plate in FIG 12.

FIG 14 is a diagram used to explain the first cam operation in response to the operation of the aperture plate in FIG 13.

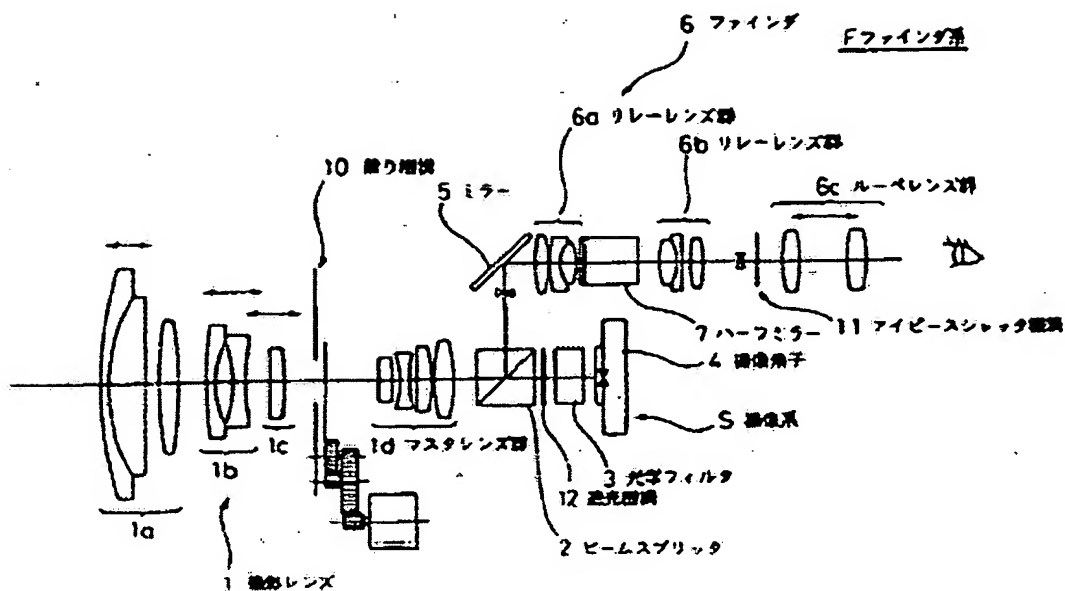
FIG 15 is a diagram used to explain the first cam operation in response to the operation of the aperture plate in FIG 13.

FIG 16 is a diagram used to explain another aperture plate in the third working example.

In these figures:

1 ... photographic lens, 2 ... beam splitter, 4 ... photographic element, 6 ... finder, 9 ... light-measuring element, 10 ... aperture mechanism, 11 ... eyepiece shutter mechanism, 12 ... light-blocking mechanism

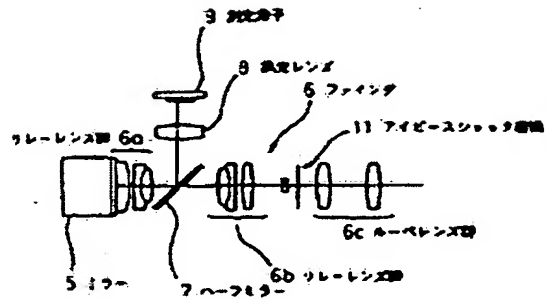
FIG 1



Finder System

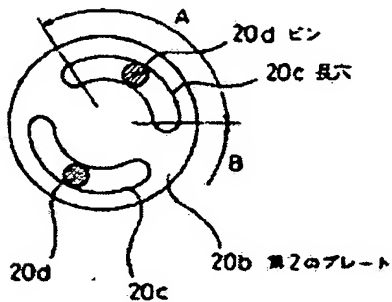
- 1 ... photographic lenses
- 1d ... master lens group
- 2 ... beam splitter
- 3 ... optical filter
- 4 ... photographic element
- 5 ... mirror
- 6 ... finder
- 6a ... relay lens group
- 6b ... relay lens group
- 6c ... magnifying lens group
- 7 ... half mirror
- 10 ... aperture mechanism
- 11 ... eyepiece shutter mechanism
- 12 ... light blocking mechanism
- S ... photographic system

FIG 2



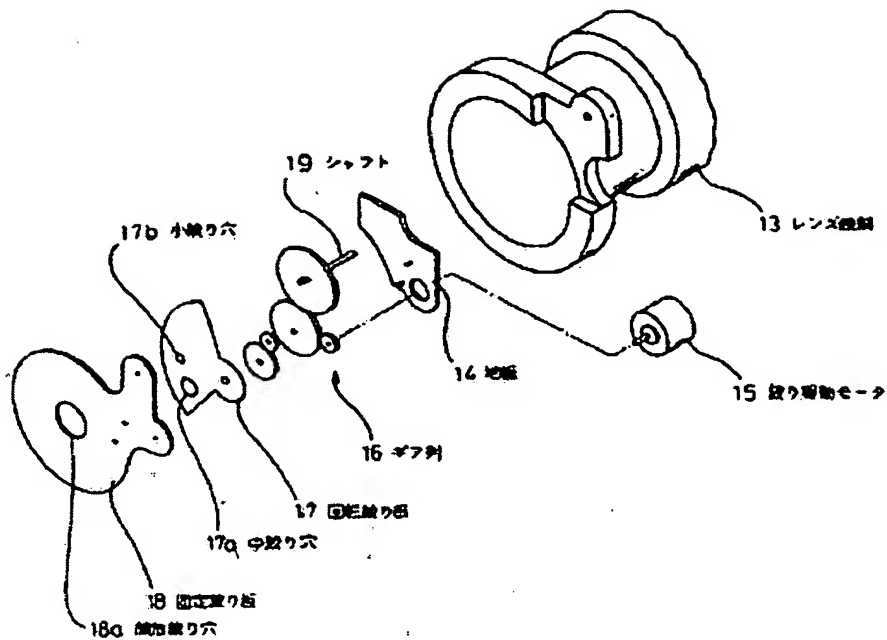
- 5 ... mirror
- 6 ... finder
- 6a ... relay lens group
- 6b ... relay lens group
- 6c ... magnifying lens group
- 7 ... half mirror
- 8 ... focusing lens
- 9 ... light measuring element
- 11 ... eyepiece shutter mechanism

FIG 6



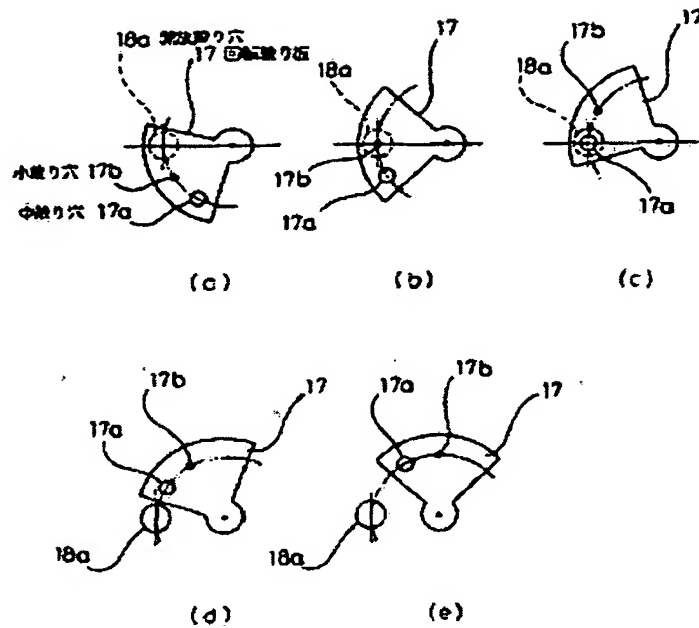
- 20b ... second plate
- 20c ... slot
- 20d ... pin

FIG 3



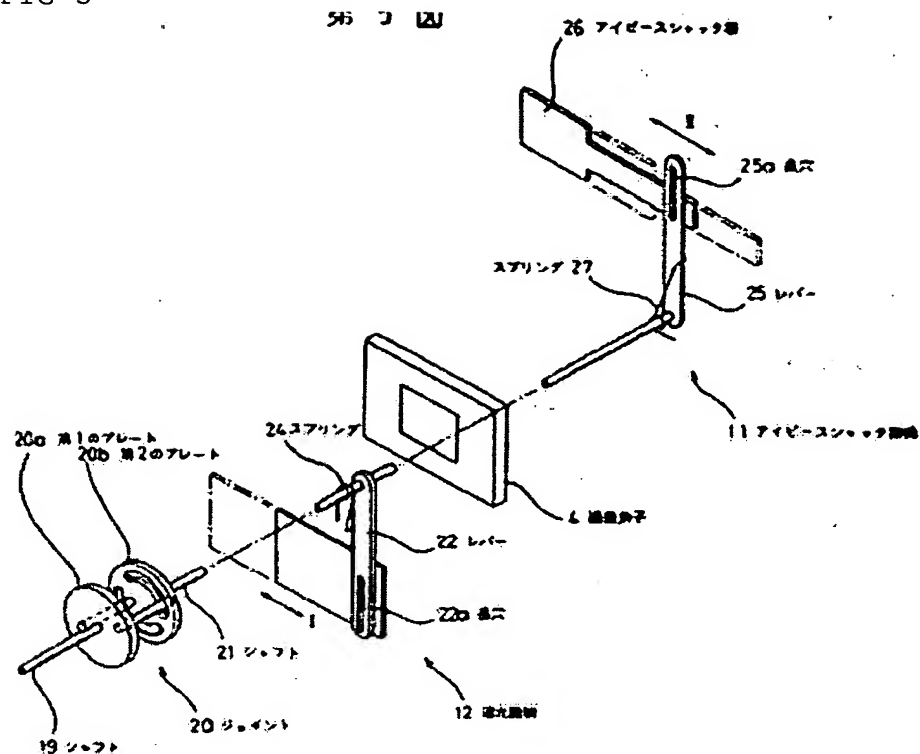
- 13 ... lens mirror cylinder
- 14 ... ground plate
- 15 ... aperture drive motor
- 16 ... gears
- 17 ... rotating aperture plate
- 17a ... medium aperture hole
- 17b ... small aperture hole
- 18 ... fixed aperture plate
- 18a ... open aperture hole
- 19 ... shaft

FIG 4



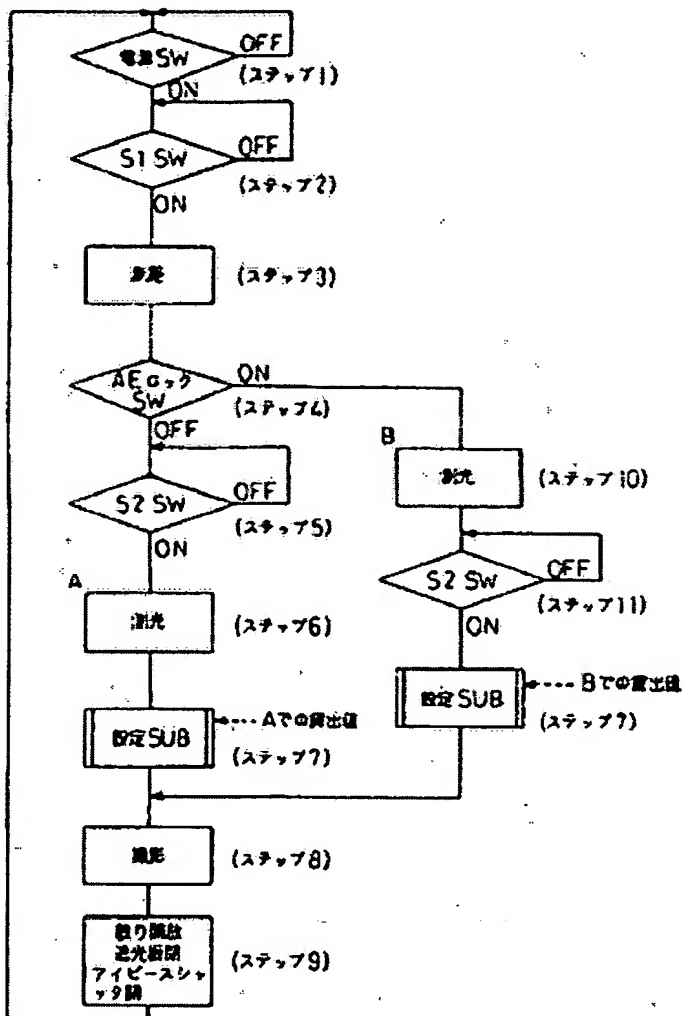
- 17 ... rotating aperture plate
- 17a ... medium aperture hole
- 17b ... small aperture hole
- 18a ... open aperture hole

FIG 5



- 4 ... photographic element
- 11 ... eyepiece shutter mechanism
- 12 ... light blocking mechanism
- 19 ... shaft
- 20 ... joint
- 20a ... first plate
- 20b ... second plate
- 21 ... shaft
- 22 ... lever
- 22a ... slot
- 24 ... spring
- 25 ... lever
- 25a ... slot
- 26 ... eyepiece shutter plate
- 27 ... spring

FIG 7



(Step 1) Power SW

(Step 2) S1 SW

(Step 3) Measure Distance

(Step 4) AE Lock SW

(Step 5) S2 SW

(Step 6) Measure Light

(Step 7) Set SUB Exposure Value at A

(Step 7) Set SUB Exposure Value at B

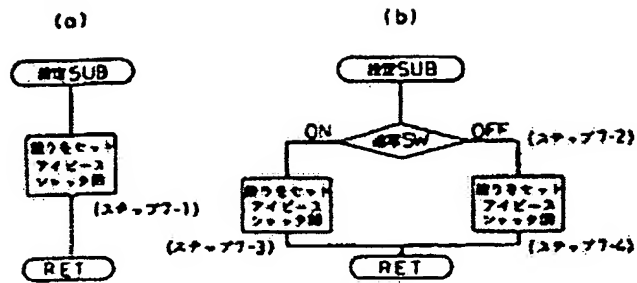
(Step 8) Photograph

(Step 9) Aperture Open, Light Blocker Closed, Eyepiece Shutter Open

(Step 10) Measure Light

(Step 11) S2 SW

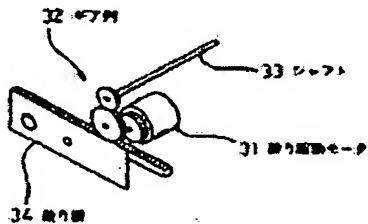
FIG 8



(a)
Set SUB
(Step 7-1)
RET

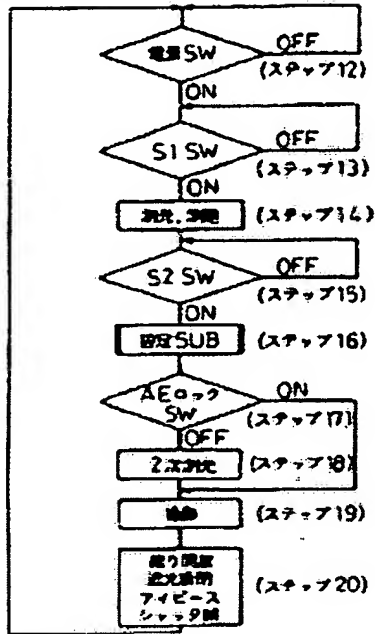
(b)
Set SUB
(Step 7-2) Rapid Shoot SW
(Step 7-3) Aperture Set, Eyepiece Shutter Open
(Step 7-4) Aperture Set, Eyepiece Shutter Closed
RET

FIG 9



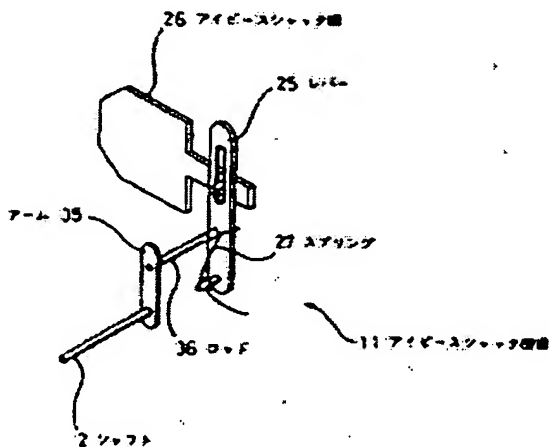
31 ... aperture drive motor
32 ... gears
33 ... shaft
34 ... aperture plate

FIG 10



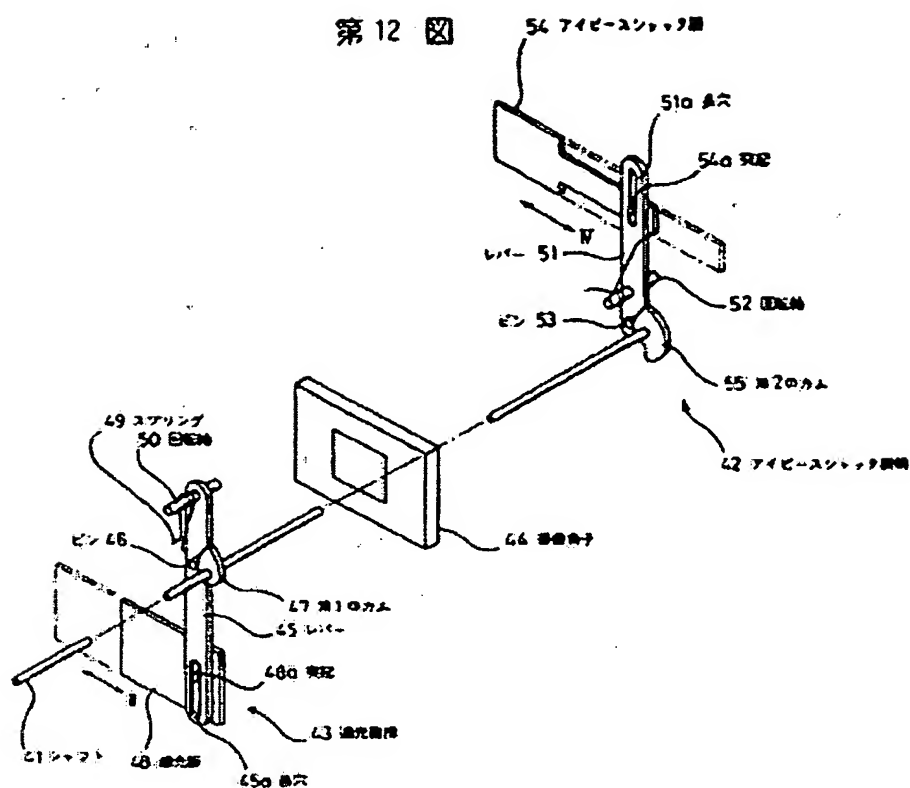
- (Step 12) Power SW
- (Step 13) S1 SW
- (Step 14) Measure Light, Measure Distance
- (Step 15) S2 SW
- (Step 16) Set SUB
- (Step 17) AE Lock SW
- (Step 18) Secondary Light Measure
- (Step 19) Photograph
- (Step 20) Aperture Open, Light Blocker Closed, Eyepiece Shutter Open

FIG 11



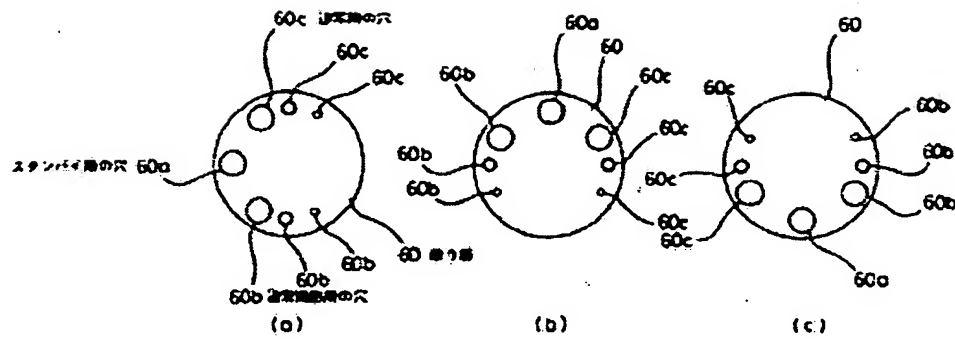
- 2 ... shaft
- 11 ... eyepiece shutter mechanism
- 25 ... lever
- 26 ... eyepiece shutter plate
- 27 ... spring; 35 ... arm; 36 .. rod

FIG 12



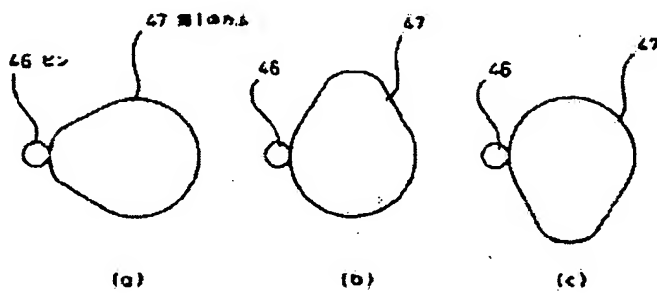
- 41 ... shaft
- 42 ... eyepiece shutter mechanism
- 43 ... light blocking mechanism
- 44 ... photographic element
- 45 ... lever
- 45a ... slot
- 46 ... pin
- 47 ... first cam
- 48 ... light blocking plate
- 48a ... protrusion
- 49 ... spring
- 50 ... rotating shaft
- 51 ... lever
- 51a ... slot
- 52 ... rotating shaft
- 53 ... pin
- 54 ... eyepiece shutter plate
- 54a ... protrusion
- 55 ... second cam

FIG 13



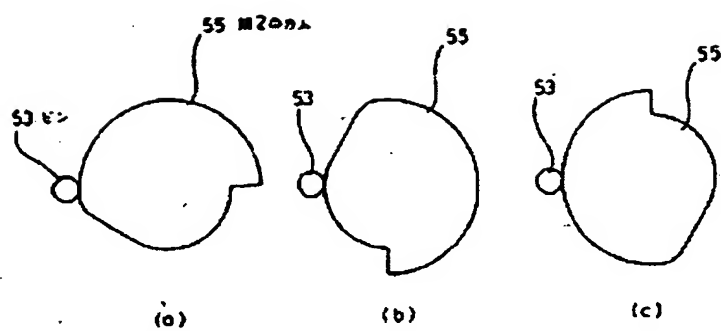
60 ... aperture plate
 60a ... standby hole
 60b ... normal photography hole
 60c ... rapid shoot photography hole

FIG 14



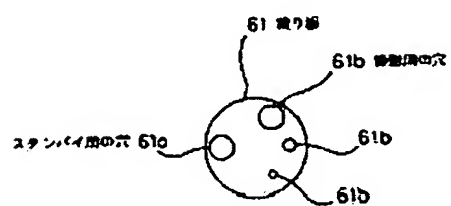
47 ... first cam

FIG 15



55 ... second cam

FIG 16



60a ... standby hole
60b ... photography hole
61 ... aperture plate